**Ethernet Basics and VLAN Configuration**

Student Version



Huawei Technologies Co., Ltd.

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# Ethernet Basics and VLAN Configuration

## Background

Ethernet technology allows data communication over shared media through Carrier Sense Multiple Access/Collision Detection (CSMA/CD). When an Ethernet network has a large number of hosts, collisions become a serious problem and can lead to broadcast storms. This can degrade network performance or even result in network breakdown. Using switches to connect LANs can mitigate collisions, but broadcast may still pose an issue.

To alleviate broadcast storms, VLAN technology divides a physical LAN into multiple VLANs so that the broadcast domains are smaller. Hosts within a VLAN can only directly communicate with hosts in the same VLAN, and must use a router to communicate with hosts in other VLANs.

A company needs to divide a Layer 2 network into multiple VLANs based on service requirements. In addition, VLAN 2 requires a higher level of security and only specified PCs can be added to VLAN 2.

To meet this requirement, ports to which users with identical services are connected on S1 and S2 can be assigned to the same VLAN, and ports with specified MAC addresses on S2 can be assigned to a specific VLAN.

In this exercise, you will learn how to configure VLAN on Huawei switches.

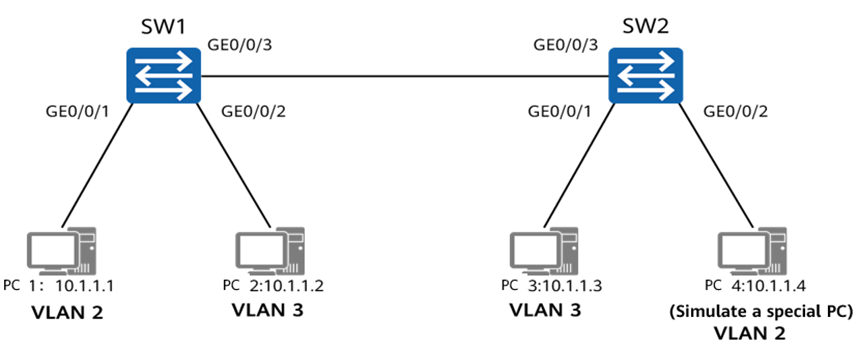
## Objectives

Upon completion of this task, you will be able to:

* Create a VLAN.
* Configure access, trunk, and hybrid ports.
* Configure VLANs based on ports.
* Configure VLANs based on MAC addresses.
* Check the MAC address table and VLAN information.

## Topology

LAB Topology



## Implementation

### Roadmap

Create VLANs.

Configure port-based VLANs.

Configure MAC address-based VLANs.

### Procedure

Name S1 and S2.

# Name the devices.

The details are not provided here.

Configure an IP address for Host1.

The details are not provided here.

Create VLANs.

# Create VLANs 2 and 3 on S1 and S2.

VLANs 2 and 3 are created successfully.

The **vlan** *vlan-id* command creates a VLAN and displays the VLAN view. If the VLAN to be created exists, the VLAN view is displayed directly.

The **vlan batch** { *vlan-id1* [ **to** *vlan-id2* ] } command creates VLANs in batches.

Configure port-based VLANs.

# Configure user ports on S1 and S2 as access ports and assign them to corresponding VLANs.

The **port link-type { access | hybrid | trunk }** command specifies the link type of an interface, which can be access, trunk, or hybrid.

The **port default vlan** *vlan-id* command configures the default VLAN of an interface and assigns the interface to the VLAN.

# Configure the ports connecting S1 and S2 as trunk ports and allow only packets from VLAN 3 to pass through.

The **port trunk allow-pass vlan** command assigns a trunk port to the specified VLANs.

The **undo port trunk allow-pass vlan** command deletes a trunk port from the specified VLANs.

By default, VLAN 1 is in the allowed VLAN list. If VLAN 1 is not used for any service, it needs to be deleted for security purposes.

Configure MAC address-based VLANs.

As shown in the networking diagram, R4 simulates a special service PC. Assume that the MAC address of the PC is 5489-982E-41FD. The PC is expected to connect to the network through any of GigabitEthernet0/0/2, GigabitEthernet0/0/4, and GigabitEthernet0/0/5 on S2 and transmit data through VLAN 2.

# Configure S2 to associate the MAC address of the PC with VLAN 2.

The VLAN membership depends on the source MAC addresses of packets, and VLAN tags are added to packets accordingly. This VLAN assignment method is independent of the location, providing a higher level of security and flexibility.

The **mac-vlan mac-address** command associates a MAC address with a VLAN.

# Configure GigabitEthernet0/0/2, GigabitEthernet0/0/4, and GigabitEthernet0/0/5 on S2 as hybrid ports and configure these ports to allow packets from MAC address-based VLANs to pass through.

On access and trunk ports, MAC address-based VLAN assignment can be used only when the VLAN is the same as the PVID. Therefore, it is recommended that you configure MAC address-based VLAN assignment on a hybrid port to receive untagged packets from multiple VLANs.

The **port hybrid untagged vlan** command assigns a hybrid port to the specified VLANs to allow untagged frames to pass through.

# Configure the ports connecting S1 and S2 to allow packets from VLAN 2 to pass through.

The ports need to allow tagged frames from multiple VLANs to pass through. Therefore, the ports can be configured as trunk ports.

# Configure S2 and enable MAC address-based VLAN assignment on GE0/0/1, GE0/0/2, and GE0/0/3.

To enable a port to forward packets based on associations between MAC addresses and VLANs, you must run the **mac-vlan enable** command.

The **mac-vlan enable** command enables MAC address-based VLAN assignment on a port.

Check the configuration.

# Check the VLAN information on the switches.

[S1]display vlan

The **display vlan** command displays information about VLANs.

The **display vlan verbose** command displays detailed information about a specified VLAN, including the ID, type, description, and status of the VLAN, status of the traffic statistics collection function, ports in the VLAN, and mode in which the ports are assigned to the VLAN.

The total number of vlans is : 4

--------------------------------------------------------------------------------*-------------------------------------*

U: Up; D: Down; TG: Tagged; UT: Untagged;

MP: Vlan-mapping; ST: Vlan-stacking;

#: ProtocolTransparent-vlan; \*: Management-vlan;

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VID Type Ports

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1 common UT:GE0/0/4(D) GE0/0/5(D) GE0/0/6(D) GE0/0/7(D)

GE0/0/8(D) GE0/0/9(D) GE0/0/10(D) GE0/0/11(D)

GE0/0/12(D) GE0/0/13(D) GE0/0/14(D) GE0/0/15(D)

GE0/0/16(D) GE0/0/17(D) GE0/0/18(D) GE0/0/19(D)

GE0/0/20(D) GE0/0/21(D) GE0/0/22(D) GE0/0/23(D)

GE0/0/24(D)

2 common UT:GE0/0/1(U)

TG:GE0/0/3(U)

3 common UT:GE0/0/2(U)

TG:GE0/0/3(U)

VID Status Property MAC-LRN Statistics Description

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1 enable default enable disable VLAN 0001

2 enable default enable disable VLAN 0002

3 enable default enable disable VLAN 0003

[S2]display vlan

The total number of vlans is : 4

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U: Up; D: Down; TG: Tagged; UT: Untagged;

MP: Vlan-mapping; ST: Vlan-stacking;

#: ProtocolTransparent-vlan; \*: Management-vlan;

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VID Type Ports

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1 common UT:GE0/0/2(U) GE0/0/4(D) GE0/0/5(D) GE0/0/6(D)

GE0/0/7(D) GE0/0/8(D) GE0/0/9(D) GE0/0/10(D)

GE0/0/11(D) GE0/0/12(D) GE0/0/13(D) GE0/0/14(D)

GE0/0/15(D) GE0/0/16(D) GE0/0/17(D) GE0/0/18(D)

GE0/0/19(D) GE0/0/20(D) GE0/0/21(D) GE0/0/22(D)

GE0/0/23(D) GE0/0/24(D)

2 common UT:GE0/0/2(U) GE0/0/4(D) GE0/0/5(D)

TG:GE0/0/3(U)

3 common UT:GE0/0/1(U)

TG:GE0/0/3(U)

VID Status Property MAC-LRN Statistics Description

--------------------------------------------------------------------------------

1 enable default enable disable VLAN 0001

2 enable default enable disable VLAN 0002

3 enable default enable disable VLAN 0003

# Check the MAC address-based VLAN configuration on the switch.

[S2]display mac-vlan vlan 10

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MAC Address MASK VLAN Priority

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5489-982e-41fd ffff-ffff-ffff 10 0

Total MAC VLAN address count: 1

The **display mac-vlan** command displays the configuration of MAC address-based VLAN assignment.

----End

## Verification

Test the device connectivity and verify the VLAN configuration.

Run the ping command on Host2 to ping Host3.

Run the ping command on Host4 to ping Host1. Capture packets on the link between S1 and S2. Data frames tagged with VLAN 2 can be captured.

Run the **display mac-address verbose** command on S1 and S2 to check the MAC address tables on the switches.